

# CHAPTER ONE

## FLOODPLAIN MANAGEMENT - AN OVERVIEW

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### A. Introduction

This handbook is presented as a tool for planners, zoning administrators, building permit reviewers, building inspectors, and other floodplain managers to help guide development in flood-prone areas and meet the requirements of the National Flood Insurance Program (NFIP) and State statutes. Much of the information in this handbook is derived from the Maryland State Model Floodplain Management Ordinance which has been adopted by many Maryland communities.

Used in conjunction with the local floodplain management ordinance, this handbook provides a resource for answering questions most frequently asked local floodplain managers. It is not intended to replace consultation with the NFIP Coordinating Office in the Technical and Regulatory Services Administration of the Maryland Department of the Environment (MDE) in more involved situations.

### B. The National Flood Insurance Program

#### 1. History



In 1968, Congress passed the National Flood Insurance Act based on the findings that: "(1) a program of flood insurance can promote the public interest by providing appropriate protection against the perils of flood losses and encouraging sound land use by minimizing exposure of property to flood losses; and (2) the objectives of a flood insurance program should be integrally related to a unified national program for floodplain management . . . ."

The Federal Emergency Management Agency's (FEMA), Federal Insurance Administration (FIA), administers the National Flood Insurance Program (NFIP) which provides reasonably affordable property insurance to cover flood losses while putting no additional burden on the taxpayers. Comparable insurance is not generally available from private companies because the risks would be too great. Statistically, a home located in the 100-year floodplain is five times more likely to sustain damage from flood than from fire. Also, it is interesting to note that almost a third of flood insurance claims are paid to properties outside the 100-year floodplain.

When Hurricane Agnes struck the Gulf and East Coasts in 1972, fewer than 1,200 communities were participating in the NFIP, with only 95,000 policies in force. Agnes caused \$3-4 billion in structural damage, yet only \$5 million was paid on flood insurance claims, about 1% of the damage. Congress realized that many flood-prone communities were not voluntarily joining the NFIP. In participating communities, many residents were choosing not to purchase flood insurance, even though structures built prior to flood hazard identification were granted subsidized insurance rates.

In response to this, the Flood Disaster Protection Act was adopted in 1973 to sharply limit federal financial assistance to non-participating communities, and to add the mandatory purchase requirement. Now all loans made by federally insured and regulated lenders on buildings in flood prone areas are required to be secured with flood insurance. By the end of the 1970s, Flood Insurance Rate Maps (FIRMs) had been prepared for more than 19,000 flood prone communities, and nearly 17,000 had adopted ordinances to join the NFIP.

In 1981, the Carter Administration set a goal: by 1988, make the NFIP self-supporting, requiring no taxpayer support to pay claims and operating expenses. During the 1980s, most post-FIRM buildings built after initial entry into the NFIP were in compliance with floodplain management regulations. The premiums for policies on these buildings are rated according to the actual risk, unlike pre-FIRM buildings, for which premium rates do not fully reflect the risk. Pre-FIRM buildings existed prior to the community's initial entry into the NFIP. The last taxpayer supported appropriations were made in 1985. The NFIP reported achieving self-supporting status in 1985, three years before the target date.

In 1989, Hurricane Hugo devastated portions of South Carolina. Flood insurance claims payments from the NFIP represented approximately 32 percent, or \$350 million of the \$1.1 billion in funds from federal agencies which were expended to help South Carolina. These payments were not funded by the general taxpayer, but by flood insurance policy holders.

NFIP records reviewed in the early '90s revealed that buildings constructed in compliance with NFIP requirements designed to minimize flood damage to buildings and contents are 77 percent less likely to be damaged than those built prior to the NFIP requirements. Only 3 percent of the buildings known to be subject to repetitive flood-damage were constructed after adoption of local ordinances. Perhaps more important, but more difficult to measure, are the hundreds of thousands of buildings that are located outside of the floodplain as a direct result of community efforts to manage development in flood hazard areas.

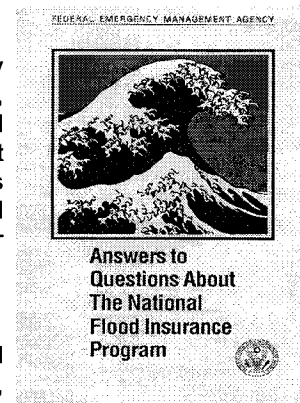
In 1994, the NFIP Reform Act was passed. It increased the limits of coverage under the NFIP (up to \$250,000 on single family homes), increased the waiting period to 30 days before a policy is effective, and tightened up on lender compliance with escrow requirements and fines for noncompliance. Mitigation insurance was added to all flood insurance policies to cover the cost of complying fully with elevation requirements of local building codes when buildings are repaired after substantial damage or sustain repetitive losses. A new National Flood Mitigation Fund was established from policy income to provide grants to fund 75% of the cost of mitigation planning and projects to mitigate future flooding. The Community Rating System was made part of the NFIP's statutory authority. Coastal erosion hazards will be studied for two years to determine the benefits and costs of mapping and regulating coastal areas subject to erosion.

Now, over 18,000 communities nationwide participate in the NFIP. Through successful interaction and support from local governments and the private insurance industry, the NFIP has grown over 25 years to a program that is able to provide efficient service to flood insurance policyholders, as well as to reduce the damaging effects of flood disasters. Unfortunately, even with more than 2.5 million policies in force, only an estimated 20% of all flood-prone buildings are covered by flood insurance.

## **2. Agreement Between Communities and the NFIP**

The NFIP uses the term "community" to refer to any jurisdiction with the authority to adopt and enforce a floodplain management ordinance, which may be a county, a town, or a city. Communities that participate in the NFIP must agree to adopt, administer, and enforce an ordinance that meets or exceeds the NFIP's standards. Community officials must commit to fulfilling the responsibilities outlined in Part 60 of the Code of Federal Regulations that they adopt into their ordinances. In return, federal flood insurance is available for all structures in the community and federal disaster assistance will be available after major floods.

Most importantly, local governments must agree to issue permits for all development allowed within the 100-year floodplain shown on the FIRM for the community, and review the development to assure that it at least meets standards outlined by NFIP for resistance to flood damage.





Hancock, Washington County  
September, 1996

Each community must designate a NFIP contact person, keep accurate and complete records of floodplain development, and agree to periodic reviews of their permitting and inspection procedures. When issuing permits, communities must document their files and be able to justify procedures and permit actions.

If a community fails to correctly implement the ordinance, FEMA will make efforts to assist the community improve its procedures. In serious or repeated infractions, FEMA may place the community on probation, which imposes a \$50 surcharge on all flood insurance policies within that community. In some cases, FEMA may suspend a community from the NFIP, which means that flood insurance and federal disaster assistance for flood events will no longer be available. Individual structures which remain in violation of a community's floodplain ordinance despite attempts by the community to correct the defect, may be denied flood insurance under Part 73 of the NFIP regulations.

Every two years each community in the NFIP will receive a Biennial Report Form directly from FEMA. This is used to update records on the communities. This form should be completed and returned directly to FEMA.

Specific aspects of ordinance adoption (Chapter 3), ordinance interpretation (Chapter 4), and ordinance implementation (Chapter 5) are covered later in this handbook.

### 3. The NFIP in Maryland

Maryland has 115 participating communities, including all 23 counties, the City of Baltimore, and 91 other cities and towns. FEMA has identified flood hazards in all of these communities except three.

As of August, 1996, the NFIP reported that Marylanders have purchased 45,200 flood insurance policies on buildings and contents, ranking the State 13th nationally in flood policy coverage. By comparison, Florida policyholders numbered more than over 1.5 million, with Louisiana and Texas ranked 2nd and 3rd with over 303,000 and 256,000 policies, respectively.

Accurate counts of the number of buildings located in the floodplain are not available for most of Maryland's counties and towns. The following estimates are extrapolated from data provided by local jurisdictions:

REGION	FLOOD PRONE BLDGS.	FLOOD INSURANCE POLICIES*	PERCENT COVERED
WESTERN (GA, AL, WA, FR)	6,000	1,026	17%
CENTRAL (BA, BC, CE, CL, HA, KE, HO, QA)	30,000	6,789	23%
SOUTHERN (AA, CA, CH, MO, PG, SM)	30,000	5,950	20%
EASTERN (CO, DO, SO, TA, WI, WO)	75,000	31,435	42%
TOTALS:	141,000	45,200	32%

NFIP estimate of policies on structures only. Separate policies can be purchased on contents (business inventory, personal property, etc.)

#### 4. National Flood Insurance Program Coordination

The Maryland State NFIP Coordinating Office is under the in the Department of the Environment (MDE). It serves as a liaison between FEMA, which administers the NFIP, and the 115 counties and towns in the State that participate in the program.

The State Coordinating Office, under contract with FEMA, assists with local ordinance administration through workshops and newsletters, and provides general technical assistance and local program review through community assistance visits (CAV). The office responds to specific floodplain management questions and represents local interests and requests to FEMA.

#### C. Flood Hazards in the State of Maryland

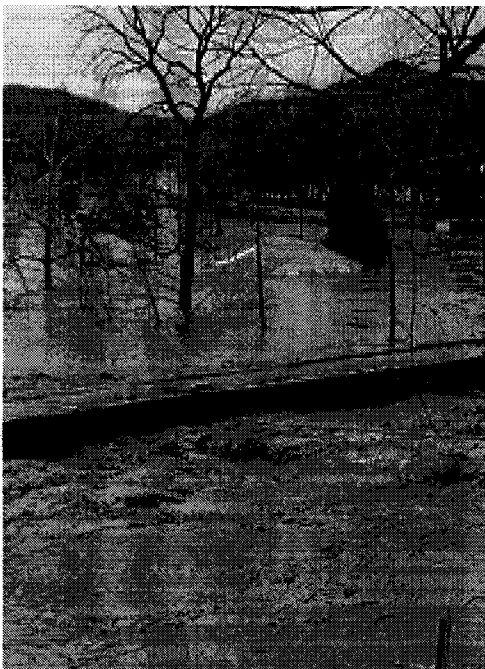
##### 1. Types of flooding

Potentially land adjacent to every body of water is subject to flooding. Flooding is a result of unusually high water levels associated with meteorological events. Flood is defined under FEMA regulations as "a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters or the unusual and rapid accumulation or runoff of surface waters from any source." The term "flood stage" refers to the level at which waters begin to rise above river banks. High water generally is not considered to be a problem until it begins to adversely impact people and their property. Basic hydrological concepts will be covered in Chapter 2. Floodplain mapping is covered in Chapter 3.

Most of Maryland's nontidal watersheds are relatively small in acreage. Prolonged or intense rains typically run off quickly, accumulating in tributary streams and main channels within several hours. The waters typically rise quickly and fall just as quickly as the flood moves downstream.

A few larger nontidal watersheds exhibit notable exceptions to the expected rapid passage of flood peaks:

- The Potomac River, which experienced historic flooding in 1889, 1924, and 1936, may stay above flood stage for 3 or 4 days. Its flood crest takes several days to move down to Washington, D.C.
- The Monocacy River's flood of record occurred in June 1972, with the waters rising nearly 40' above normal in places. It often takes a few days for such high water levels to return to normal.
- The Susquehanna River drains a large watershed extending above Pennsylvania into New York State. The record flood, which exceeded the predicted 100-year flood, was a result of Hurricane Agnes in 1972. High water lasted more than a week.



Wills Creek, Allegany Co. January, 1996  
Photo Courtesy of Gary L. Schade

Waters in tidal areas often rise and fall more slowly and predictably, and may be influenced by tidal cycles, extensive low pressure weather systems, and strong prolonged onshore winds. Although large areas may be flooded, flow is not as strong as nontidal rivers experience, since gradients are not as great. Erosive forces are significant only along shorelines exposed high wave energies. Tidal flooding affects extensive areas of low relief along the Chesapeake Bay and its tributaries and the back bays behind the Atlantic coast.

Flooding along the Atlantic coast and the Chesapeake Bay caused by tropical storms, hurricanes, and nor'easters may be very widespread and severe. Complex computer modeling performed by the National Hurricane Center produced maps used by State and local emergency managers to plan evacuations. The "worst case" hurricane would produce flooding that exceeds the 100-year flood levels shown on the FIRM. Hurricanes and tropical storms typically move through an area at 15-25 miles per hour, and thus do not produce prolonged flood conditions. However, the nor'easter of record which occurred in March of 1962, stalled off the coast for several tide cycles.

## **2. The 100-Year Flood and Floodplains**

The 100-year flood is a flood which has a one percent chance of being equaled or exceeded in any given year. It has a 26% chance of occurring over the life of a 30-year mortgage, and a 63% chance of occurring over a 100 year period. It may be referred to as the 100-year flood, 100-year recurrence interval flood, 100-year frequency flood, 1% flood, 1% annual chance flood, and base flood. Since these are probability statements, it should be understood that "100-year floods" may occur more frequently than once every 100 years.



George's Creek, Allegany County  
September, 1996

Technically, only the outer edge of the 100-year mapped floodplain has a risk of 1%. The risk rises for sites closer to the flooding source and at lower elevations, even though many people think of the entire 100-year floodplain as having the same risk. There are areas within the mapped 100-year floodplain that may flood more frequently and to greater depths than others.

Many of the flood maps and elevations described in Chapter 2 are based on estimates of the 100-year flood discharge, which may be determined by a number of techniques. These are based on conditions at a point in time, and factors such as the size of the watershed, the availability of stream gage records, and the level of detail used in mapping the model may contribute uncertainty to the 100-year flood discharge estimates. Subsequent changes in land use in the watershed and natural and human changes to the channel and floodplain contribute further uncertainty. After the flood discharge rate is determined, a computerized hydraulic model determines the elevation of the 100-year flood. Hydraulic models, depending on the level of accuracy of information on topography, friction losses, and hydrology, can produce estimates of 100-year flood elevations within 0.5 to 2.0 feet. Once the elevation of the 100-year flood is determined, the extent of the floodplain can be mapped. Again, topographic maps vary in precision and level of detail.

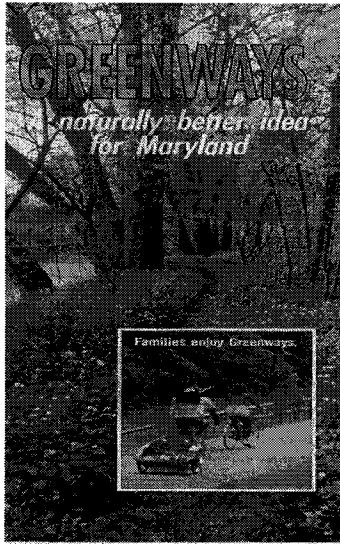
The accuracy of the floodplain boundary line is influenced most strongly by the quality of the 100-year discharge estimate. The next most significant factor is the quality of the topographic mapping. Research suggests that the probable nationwide standard error for base flood elevation mapping is 23% of the base flood depth. This value, translated into an average depth, amounts to about 3 feet. Thus, the floodplain boundary line shown on a map is not absolute, and structures located within several feet vertically of the 100-year floodplain may be at risk. In flat areas, structures located within several hundred feet horizontally of the 100-year floodplain boundary also may be at risk.

The standard error is increased by the age of most flood studies and the fact that they are based on existing development at the time of the study. Any area which has experienced significant subsequent floodplain development may experience different flooding from that predicted by the study. Maryland requires that structures be elevated an additional foot above the flood elevation to account, in part, for such uncertainties.

## **3. Regulating 100-year Floodplains in Maryland**

Local jurisdictions regulate development activity within 100-year floodplains delineated by the NFIP. The minimum standards of the NFIP do not preclude development. They provide performance standards to allow use of land while assuring minimization of hazards and property damage. Almost all Maryland communities exceed federal standards in their adopted ordinances.

Floodplains along nontidal rivers and streams, those that freely flow under the force of gravity, are regulated both by the State and by local jurisdictions. Maryland's regulations clearly preclude development that increases the flood hazard on improved property. Therefore, the State's permit program focuses on engineering analyses.



Areas subject solely to tidal flooding are regulated only by local jurisdictions. In areas where a State permit is not required, careful local implementation becomes particularly important. However, communities should note that State jurisdiction is based on flood maps which predict the source of flooding for the 100-year flood. Therefore, some normally tidal waterways are inundated by riverine sources during the 100-year flood and are subject to State permit requirements.



#### **D. Additional Information**

The State NFIP Coordinating Office assists communities with interpretation, administration, and enforcement of floodplain management ordinances, and has developed forms to assist communities be prepared for CAVs. They can be reached at the following:

**Phone Number (410) 631-3914**

State NFIP Coordinating Office  
Maryland Department of the Environment  
2500 Broening Highway  
Baltimore, MD 21224

**Fax Number (410) 631-3873**

Maryland is part of FEMA Region III which is headquartered in Philadelphia, Pennsylvania. The address, phone, and fax numbers are:

**Phone Number (215) 931-5512**

Mitigation Division  
Federal Emergency Management Agency  
Region III  
105 South 7th Street  
Philadelphia, PA 19106-3316

**Fax Number (215) 931-5501**

General information about the National Flood Insurance Program can be obtained by calling the **NFIP Information Number (800) 638-6620**.

FEMA and the Federal Insurance Administration have produced numerous manuals and guidance documents on floodplain management, including Elevation Certificates, V-Zone Certificates, and Floodproofing Certificates as well as Flood Insurance Rate Maps and Flood Insurance Studies (which includes Flood Boundary and Floodway Maps) can all be ordered by calling the **Flood Map Distribution Center at (800) 358-9616**.